Amendments to the Claims:

This listing of claims replaces all prior versions of claims in the application.

Listing of Claims:

1. (Original) A method for real-time determination of exhaust gas flow through an exhaust pipe of a vehicle, the method comprising:

measuring a pressure difference upstream and downstream of a screen;

measuring exhaust gas temperature; and

determining the exhaust gas flow based on the pressure difference and the temperature.

2. (Original) The method of claim 1 wherein the step of determining the exhaust gas flow comprises determining the exhaust gas flow based on a square root of the quotient of the pressure difference and the temperature.

3. (Original) The method of claim 2 wherein the step of determining the exhaust gas flow further comprises:

determining a constant based on known flows, known temperatures, and a measured pressure difference; and

multiplying the constant by the square root.

4. (Original) The method of claim 1 wherein the step of determining the exhaust gas flow comprises determining the exhaust gas flow according to:

Flow = K * (pressure difference)x * (temperature)y where "K" represents a constant.

5. (Original) The method of claim 4 further comprising:

measuring the pressure difference for a plurality of known flows and a constant temperature; and

determining slope of the logarithm of the known flows as a function of the logarithm of the pressure differences to determine a value for the exponent "x".

6. (Original) The method of claim 4 further comprising:

measuring the pressure difference for a plurality of known temperatures and a constant flow; and

determining slope of the logarithm of the quotient of the flow and the pressure difference as a function of the logarithm of the temperature for each temperature; and

averaging the slopes for each temperature to determine a value for the exponent "y".

7. (Original) The method of claim 4 wherein a value for "K" is empirically determined.

8. (Original) The method of claim 1 wherein the step of determining the exhaust gas flow comprises determining the exhaust gas flow according to: differential pressure = A * flow + B*flow^2 where "A" and "B" are empirically determined constants.

9. (Original) The method of claim 8 wherein "A" and "B" are determined during calibration by measuring differential pressures across the screen during a low flow condition and a high flow condition, respectively, at a reference exhaust gas temperature and ambient pressure.

10. (Original) The method of claim 8 wherein the step of determining the exhaust gas flow further comprises adjusting the real-time measured pressure difference based on the measured exhaust gas temperature, the reference exhaust gas temperature, measured ambient pressure, and the reference ambient pressure.

11. (Original) The method of claim 10 wherein the real-time measured pressure difference is adjusted by multiplying by a factor "K", where: K=(TREF/Tactual)-2Y(PAmbient/PREF) and "Y" is determined based on a relationship of differential pressure as a function of temperature for the low flow and high flow conditions.

12. (Original) The method of claim 1 wherein the screen covers substantially the entire area of the exhaust pipe.

13. (Original) The method of claim 1 wherein the screen mesh is selected to generate a measurable pressure difference while minimizing back pressure and formation of condensation on the screen.

14. (Original) The method of claim 1 wherein the screen includes about six strands per inch arranged in a generally rectangular array that extends across the exhaust pipe.

15. (Currently Amended) A portable system for determining exhaust gas flow of a vehicle, the system comprising:

a tube adapted for placement on an exhaust pipe of the vehicle, the tube including a flow restricting element extending <u>substantially entirely</u> across a cross-sectional area of the tube, a first port disposed upstream of the flow restricting element for measuring a first pressure, and a second port disposed downstream of the flow restricting element for measuring a second pressure; and

a device in communication with the tube for determining the exhaust gas flow based on a difference between the first and second pressures.

16. (Original) The system of claim 15 wherein the tube further comprises a third port for measuring temperature of exhaust gas flowing through the tube.

17. (Original) The system of claim 16 further comprising a thermocouple extending through the third port and in communication with the device to measure temperature of the exhaust gas flowing through the tube.

18. (Original) The system of claim 16 wherein the device determines the exhaust gas flow based on a difference between the first and second pressures and the temperature of the exhaust gas.

19. (Original) The system of claim 15 wherein the device includes at least one differential pressure transducer to generate a signal based on the difference between the first and second pressures.

20. (Original) The system of claim 15 wherein the flow restricting element comprises a screen.

21. (Original) The system of claim 20 wherein the screen comprises a plurality of strands arranged in a generally square array with less than ten strands per inch.

22. (Original) The system of claim 20 wherein the screen is made of stainless steel.

23. (Original) The system of claim 15 wherein the flow restricting element comprises a disk having regularly spaced openings.

24. (Original) The system of claim 23 wherein the openings comprise between 60% and 65% of the cross-sectional area of the disk.

25. (Original) The system of claim 15 wherein the device includes a microprocessor to determine the exhaust gas flow.

26. (Original) The system of claim 15 wherein the tube is straight to reduce added back pressure.

27. (Original) The system of claim 15 wherein the flow restricting element includes sufficient spaces to limit any increase in back pressure to less than six percent.

28. (Original) The system of claim 15 wherein the device comprises:

a first differential pressure transducer generating a first signal based on the difference between the first and second pressures corresponding to a first range of exhaust flows; and

a second differential pressure transducer generating a second signal based on the difference between the first and second pressures corresponding to a second range of exhaust flows.

29. (Original) The system of claim 15 further comprising:

a condensation trap positioned upstream relative to the flow restricting element.

30. (Original) The system of claim 29 wherein the condensation trap comprises:

a conical screen having an apex pointing upstream; and

a baffle disposed downstream of the conical stream.

31. (Original) The system of claim 15 wherein the tube further comprises a fourth port for extracting samples of exhaust gas passing through the tube.

32. (Original) A portable exhaust gas flow sensor for real-time on-board measurement of exhaust gas flow from a vehicle, the sensor comprising:

a straight tube for connecting to an exhaust pipe of the vehicle, the tube including an interior screen to generate a pressure drop as exhaust gas flows across the screen, an upstream port for measuring pressure upstream of the screen, a downstream port for measuring pressure downstream of the screen, and a thermocouple port for measuring exhaust gas temperature;

a differential pressure transducer in communication with the upstream and downstream ports for generating a signal based on a pressure difference between the upstream and downstream ports;

a thermocouple in communication with the thermocouple port for generating a signal based on temperature of exhaust gas flowing through the straight tube; and

a processor for receiving the signals from the differential pressure transducer and the thermocouple and determining exhaust gas flow based on the received signals.

33. (Original) The sensor of claim 32 further comprising:

a second differential pressure transducer in communication with the upstream and downstream ports for generating a second differential pressure signal based on the pressure difference between the upstream and downstream ports, wherein the first differential pressure signal corresponds to a first range of exhaust gas flows and the second differential pressure signal corresponds to a second range of exhaust gas flows.

34. (Original) The sensor of claim 33 wherein the processor selects one of the first and second differential pressure signals to use in determining the exhaust gas flow.

35. (Original) The sensor of claim 32 wherein the processor determines exhaust gas flow according to:

exhaust gas flow = $K\Delta P^x T^y$

where ΔP represents the differential pressure, T represents the temperature of the exhaust gas, and K, x, and y are empirically determined.